

# *CARNIVOROUS PLANT NEWSLETTER*

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# CARNIVOROUS PLANT NEWSLETTER

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Front cover: *Dosea arcturi*, Warren Burn Swamp, Fiordland National Park, New Zealand.

Rear Cover: *Dosea stenopetala*, Mt. Memphis, Fiordland National Park, New Zealand. Both photos by Bruce Salmon. See article this issue.

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Views expressed in this publication are those of the authors, not necessarily the editorial staff.

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# ICPS Seedbank

C/O Thomas J. Johnson, P.O. Box 12281, Glendale, CA 91224-0981

1/23/94 Update

- Capsella bursa-pastoris* (1)  
*Dionea muscipula*  
*Drosophyllum lusitanicum* (3)  
*Drosera adelae* 'red flower' (2)  
*D. admirabilis* (1)  
*D. aliciae*  
*D. anglica* Cold Lake Bog, OR (1)  
*D. auriculata* (5)  
*D. burkeana* (4)  
*D. burmanni* (2)  
*D. capensis*  
*D. capensis* 'alba' (7)  
*D. capensis* 'Giant' (1), wide leaf (1)  
*D. capensis* 'Narrow Leaf'  
*D. capensis* 'red leaf' (3)  
*D. capensis* wide lf, dk prple flwr (5)  
*D. capillaris* (3) & *alba* (4)  
*D. capillaris* 'pink' (3)  
*D. capillaris* 'long leaf' (1)  
*D. coccicaulis* (1)  
*D. collinsae* (3)  
*D. dielsiana*  
*D. filiformis filiformis* (8)  
*D. filiformis* X *Calif Sunset* (2)  
*D. indica* (3)  
*D. glanduligera*  
*D. indica* 'rd plt, pk flwr'  
*D. indica* 'rd plt, orange flwr'  
*D. indica* 'grn plt, pk flwr'  
*D. indica* 'white' (10)  
*D. intermedia*  
*D. intermedia* 'Carolina Giant'  
*D. intermedia* 'Tropical'  
*D. intermedia* Cuba (1)  
*D. intermedia* Giant (2)  
*D. intermedia* "Brunswick, N.C."  
*D. intermedia* 'Brazil' (1)  
*D. intermedia* 'Mt. roraime' (1)  
*D. intermedia* 'Pine Barrens'  
*D. intermedia* 'Walker Lk, Ont.' (2)  
*D. natalensis* (5)  
*D. peltata* 'green rosette' Molcoa, NSW  
*D. neesii* esp. *neesii*  
*D. platypoda*  
*D. platystigma*  
*D. ramellosa*  
*D. rotundifolia* 'Bruce Penn, CAN' (2)  
*D. rotundifolia* 'Haines, AL' (15)  
*D. rotundifolia* 'Mendocino County, CA' (2)  
*D. rotundifolia* 'Freelton, Ont., Canada' (10)  
*D. rotundifolia* 'S. Bohemia Czech Rep.'  
*D. spatulata* (6)  
*D. spatulata* 'aihmi Prefect, Japan'  
*D. spatulata* 'Kansai'  
*D. spatulata* 'hairy sepals' Gympie, QLD (11)  
*D. spatulata* 'North Island', NZ (3)  
*D. spatulata* 'Victoria' (4)  
*D. spatulata* 'Hong Kong' (5)  
*D. spatulata* 'Queensland' (2)  
*D. spatulata* 'New Zealand' (3)  
*D. species* S. Africa rosette (4)  
*D. sp.* 'Magaliesburg' (9)  
*Sarracenia alata* (3)  
*S. alata* *Nigrapurpurea* (6)  
*S. flava*  
*S. flava* 'Fitzgerald, GA' (10)  
*S. flava* 'all green' (1)  
*S. flava* 'typica' N.C. (5)  
*S. flava* 'Ben Hill County, CA'  
*S. flava* 'ruby throat' (6)  
*S. leucophylla*  
*S. leucophylla* 'all red' (8)  
*S. leucophylla* 'dark purple venation' (6)  
*S. leucophylla* yellow flr, white top (9)  
*S. leucophylla* 'yellow river, Chipola' (1)  
*S. minor*  
*S. minor* 'Ben Hill County, GA' (6)  
*S. oreophila* 'colored veins, wide mouth' (4)  
*S. oreophila* 'pale grn, tall form' (13)  
*S. purpurea*  
*S. purpurea purpurea* (10)  
*S. purpurea venosa* East. NC (4)  
*S. purp venosa* (7)  
*S. rubra*  
*S. rubra gulfensis* (3)  
*S. rubra jonesii* (13)  
*S. X alata X minor* (2)  
*S. X (alata X psittacina) X alata* (?)  
*S. X flava X leucophylla* (4)  
*S. X (flava red X leuco) X self* (1)  
*S. X flava X psittacina* (1)  
*S. X leuco X alata* (6)  
*S. X leuco X S. rubra* (6)  
*S. X minor X flava (S. X harperi)* (3)  
*S. X mitchelliana X S. leucophylla* (3)  
*S. X prittacina X rubra* (5)  
*S. X chelsonii* (15)  
*S. X willissi* (6)  
*Utricularia chrysantha*  
*U. lateriflora* (2)  
*U. uliginosa* f. *albida* (5)  
*P. alpina* W. Slovakia (13)  
*P. moranensis* (1)  
*P. moranensis caudata* (1)  
*P. vulgaris* (1)  
*P. vulgaris* Jeseniky Mts, Czech Rep.  
*N. X thorelli X ?* (1)

PLEASE INCLUDE A SELF-ADDRESSED-STAMPED ENVELOPE WITH ALL U.S. CORRESPONDENCE

( ) indicates number of seed packets—usually under 15 \$1.00 per packet

Seed Donations are needed and are gladly accepted. I've shipped out over 500 packets of seed since Dec 1st, so the Demand is quite great. Please list substitutes. Checks should be made out to ICPS.

This seed update was current as of January 23, 1994, so expect many changes. Updates are available for an SASE.

# **NEPENTHES HYBRID CROSSES** **MADE BY: Bruce Lee Bednar & Orgel Clyde Bramblett**

YEAR	CROSS	BREEDER	HYBRID NAME
1982	hasiana x ventricosa (green form)	Bramblett	—
1982	mirabilis (Australian) x mixta superba	Lang/Bramblett	—
1982	ventricosa (green form) x ventrata G	Bednar	x "LeeAnn Marie"
1983	hasiana x ventrata G	Bednar	x hasiata
1983	kamptiana x ventricosa (pink-Laguna Pro.)	Bednar	x margaretea
1983	kamptiana x hasiana	Bednar	x sullivanii
1983	mirabilis "Gold Star" x mixta superba	Bednar	x leessii
1984	rokko x mixta superba	Bednar	x excellens var. superba var. "Jessica Lauren"
1984	kamptiana x maxima	Bednar	x splendiana
1985	Balmy koto x Dominii var. intermedia	Bednar/Weigner	x weignerii
1985	rokko x Savannah Rose	Bramblett/Johnson	—
1985	cisoensis x wittei	Bramblett	—
1995	cisoensis x mixta superba?	Bramblett	—
1986	mixta x ventricosa (pink-Laguna Pro.)	Bednar/Bramblett	x madisonii
1986	kamptiana x mixta superba	Bednar/Bramblett	x redlanderii
1986	splendiana x mixta superba	Bednar/Bramblett	x dianiana
1986	thorelii x Savannah Rose	Bednar/Bramblett	x "Dwarf Peacock"
1986	ventrata x hibberdii	Bednar/Bramblett	x "Michael Lee"
1987	rafflesiana x margaretea	Bednar/Bramblett	x wilsonii
1987	mirabilis x Ted Payne	Bednar/Bramblett	—
1987	margaretea x sullivanii	Bednar/Bramblett	x "Mary Cruz"
1988	leessii x splendiana	Bednar/Bramblett	x "Cathy Jo"
1988	margaretea x hibberdii	Bednar/Bramblett	x calamity
1988	margaretea x mirabilis (Australian)	Bednar/Bramblett	x blakei
1988	ventrata x Savannah Rose	Bednar/Bramblett	x inexpectus
1989	truncata x margaretea	Bednar/Bramblett	x yarosis
1989	thorelii x rafflesiana nivea	Bednar/Bramblett	x "Amy Michelle"
1989	splendiana x reinwardtiana	Bednar/Bramblett	x harrisiana
1989	splendiana x redlanderii	Bednar/Bramblett	—
1989	splendiana x accentual koto	Bednar/Bramblett	x mathesonii
1989	morganiana x mirabilis (Australian)	Bednar/Bramblett	x cravenii
1989	mixta x fulgent koto	Bednar/Bramblett	x davineana
1989	distillatoria rubra x ventricosa (pink)	Bednar/Bramblett	x butcherii var. "Alta May"
1990	splendiana x sullivanii	Bednar/Bramblett	x vandiana
1990	hachijo x (thorelii x dyeriana)	Bednar/Bramblett	x harelina var. alba var. vittata var. rouge var. "Boca Rose"
1992	splendiana x ventricosa (pink)	Bednar/Bramblett	x sheridaniana
1992	margaretea x hasiana	Bednar/Bramblett	x andrewensis

Female parent is listed first, pollinator second

## **Editorial note:**

I would like to apologize to both Bruce Bednar and Clyde Bramblett for the list that was placed in the December 1993 issue of CPN. According to Bruce the list printed was not complete and had many misspellings. So please disregard the previous list and use the above list as your point of reference to there Nepenthes Hybrid Crosses. Sorry guys I hope this helps your cause and please keep us updated of new crosses.

## **Want Ad**

**Paul Milauskas** (38 Manchester Court, Fox River Grove, IL 60021, 708/639-2998).  
 Want to buy or trade for: *Nepenthes villosa*, *N. truncata*. Can trade *N. chelsonii* x *irregulata*, or perhaps others.

## CALL FOR ARTICLES AND PHOTOS

Now that CPN is caught up and publishing on time, our supply of articles, notes, etc. is getting thin again. Before spring and then summer come on and you get busy outdoors or with your plants, consider doing that article to submit for consideration in CPN. Several folks have sent nice articles on CP companion plants and other things somewhat peripheral to CP and we have had to turn them down since there are other venues for other kinds of plants and we believe our readers wish us to stick as close to CP as possible. When doing your article, please refer to requirements printed on the inside back covers of recent CPN issues, particularly regarding typing, word processing and spacing of lines.

The time has come to put out a call for quality photos for front and back cover use. Again, we have pretty well run through our supply of contributor photos for covers and rather than run pictures from private editorial collections all the time, we would like to look at more reader material.

A few basic rules on the photos. We prefer 35 mm slides but good quality prints can now be accepted. Number the slide margin and lightly on backs of prints and write identification and other legend info on a separate sheet of paper for each photo number. Do not write on the backs of prints. All material must be sharp with backgrounds that do not absorb the subject. We prefer subjects that have not appeared often on covers or in the pages of CPN previously, although unusual shots of some common material may be used. We will project slides and examine prints closely and promptly return those that seem not technically useful. Those we hold, with your permission, may not appear for a year or more since there will only be eight front and back covers per year. We may use occasional photos as spot illustrations in an issue where the articles do not have photos submitted by the authors. We will endeavor to return all material held for use promptly after use. However, the safest course is to submit a duplicate in case of loss so you will have the original.

One other point. Usually, photographers and growers are anxious to be credited for a photo, and that is general policy in most publications including CPN. However, we have regrettably been informed that theft of plants is again on the rise and some grower/photographers do not wish to publicize that they are so successfully growing a certain species. We certainly abhor the practice of plant theft and do not wish to indirectly contribute to it. Therefore, if you wish to submit photos for the sake of reader enjoyment, and knowing that you grew or photographed certain plants, we can use them without acknowledging the identity of the grower and/or photographer. We do not want to discourage submission of super material because of unscrupulous people in the world and we hope that those of you who may be at risk will consider CPN anyway. We also pledge not to privately reveal the source of the plant or picture. Remember to request anonymity if you wish, otherwise we will assume acknowledgment is desired.

Written material (and photos to accompany it) can be sent to either Joe or Don. Send "unattached" potential cover photos to Don.



# News and Views

**Phill Mann** (16 Osborne Road, Mt. Barker, 6324, West Australia)

During the month of July I succeeded in traveling the 4,500 kilometers to the north west of our state, an area known as the Kimberly's. I stayed with friends at the Drysdale River Station and managed to make time to search for C.P.'s in the surrounding areas. During the week and a half there I found four forms of *Drosera indica* — green plants with light pink flowers, green plants with deep pink flowers, red plants with very dark pink flowers and red plants with orange flowers. *Byblis liniflora* grew everywhere in three forms — white flowered, type plants with pink flowers and the very dark form with dark pink flowers. *Drosera petiolaris* grew in many locations and the four forms appeared to be very common. Although it was very dry at this time and most *Drosera* were going dormant *D. petiolaris* was still very large and attractive. The small form growing in the damp creek beds and only managing 1 cm in size, to the great wooley form reaching 8 cm across. *Utricularias* were every where and the most common was *U. chrysantha* as it gave some of the valleys the golden tinge of colour. There were two blue flowering terrestrial utrics, two yellow aquatics and a beautiful tiny utric that only grew 2 cm tall with white flowers having a light touch of mauve. I located this utric after spending a few hours on hands and knees locating the tiny *Drosera banksii*. Just north of Drysdale (150kms) is the Mitchell river plateau, an area that is unique and very spectacular, and a botanist's heaven as there exists small pockets of rain forest, but most are inaccessible. I made one such trip by helicopter, the area was so amazing as there were plants everywhere that were so strange and so many that were not known from our state. Unfortunately I ran out of time and film, so I have made plans for the return trip, but I have decided I will fly the 4,500kms as I wasted so much plant collecting time on the road. I collected seed of most of the C.P.s and have sent most of it to the C.P. Seed banks for those who wish to try these great plants. I am now attempting to introduce these plants into tissue culture with some great success so far.

**Chad Williams** (2929 S. Branson, Marion, IN 46953)

I've been a member for one year now, and I must say I am very pleased with the Newsletter (magazine) that the ICPS puts out. I enjoy reading all the articles in it. I only have a small collection of carnivorous plants consisting of *D. capensis*, *D. capillaris*, several *Sarracenia*, and Venus flytraps. I also had very good luck with an outdoor bog this past summer, it was a small one, only having about 15 *Dionaea muscipula*, and several *Sarracenias*. I would like to say a special thanks to Peter Pauls Nurseries, for answering so many questions for me, and sending very healthy plants. I would love to hear from anyone who has interests in CP's.

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## CARNIVOROUS PLANTS OF WHANGAMARINO SWAMP NEW ZEALAND

by

Bruce Salmon, 13 Rothery Road, Manurewa, Auckland, New Zealand

In late November, 1991, three friends and I drove about 45 minutes south of Auckland to the northern flood plain of the Waikato River. Called Whangamarino Swamp, this wetland is used in times of flood to contain the waters of the Waikato River which drains the central high country of the North Island from Lake Taupo.

Whangamarino is made almost entirely of Sedge neat although it does have

hummocks of sphagnum moss here and there. The year before we visited a large fire had swept through the swamp and burnt most of the sedge back to ground level, Consequently the two utricularia species common to this swamp were in mass flower.

*U. novae-zelandiae* is a beautiful species with its usually solitary flower (1 cm across) atop a 10 cm tall scape. The lower lip of the corolla is light lilac with dark mauve veins and has a yellow palate with a dark mauve margin. The upper lip is also light lilac with dark mauve veins.

*U. delicatula* was found in abundance in slightly more elevated areas, Its slender scones up to 10 cm tall bear 1-8 dainty flowers about 1cm across with usually no more than two open at a time. The lower lip of the corolla is white with a tinge of lilac an its extremities, as is the upper lip. The upper lip is very variable in shape ranging from a single narrowly elliptical lip to two narrowly elliptical lips to an intermediate



Figure 1. Whangamarino Swamp, New Zealand.



Figure 2. *Utricularia novae - zelandiae*, Whangamarino Swamp, New Zealand.



Figure 3. *Utricularia delicatula*, Whangamarino Swamp, New Zealand.

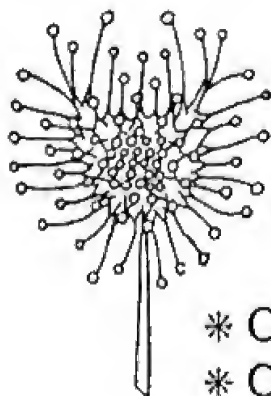
where the two are fused together. All these variations may occur on a single scape.

We also managed to find - few *D. binata* growing in the Sphagnum hummocks which probably protected them from the fire. Only one *Drosera spatulata* was found that day and I can only summarize that the rest were lost to the fire, although *D. spatulata* grows very locally at best particularly so in large swamps.

It seems to me that fire is a necessary part of swamp dynamics especially for the smaller plants to survive. Otherwise, the sedge will usually smother the area within three year.

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### Literature Review

Judziewicz, EJ and RG Koch. 1993. Flora and Vegetation of the Apostle Islands National Lakeshore and Madeline Island, Ashland and Bayfield Counties, Wisconsin. Mich. Bot. 32:43-189.

The Apostle Islands is a group of a dozen or so islands in western Lake Superior, just over the line from Michigan's upper peninsula in Wisconsin. Only one of the islands is permanently inhabited, but the islands have suffered over the years from logging, and attempts to establish homesteads which were largely abandoned. They present an interesting mixture of some undisturbed original growth and secondary growth. Many of the islands have sphagnum bogs (no fens described), located either near the shorelines or as small depressions in the summits of the islands. Wisconsin's only occurrence of *Pinguicula vulgaris* is on shale cliffs where the plants grow nearly inaccessibly in dripping water on one island. *Drosera anglica* and *D. linearis* are described as rare throughout the state and have been reported in the past on these islands but were not seen during this survey (nor are vouchers on file). Other CP noted were: *D. intermedia*(rare), *D. rotundifolia*, *Utricularia cornuta*, *U. vulgaris*(sic), *U. intermedia*, *U. resupinata*, and *Sarracenia purpurea*.

Earley, LS. 1993. Black market wildlife. Wildlife in North Carolina. 57:4-11.



Not only is North Carolina being attacked on the botanical front, this haven of a remarkable number of reptile and amphibian species is now suffering poaching of the latter. Of CP interest in the article is a sidebar of a half a page including a photo describing briefly problems with poaching of *Dionaea*. Mainly due to habitat destruction and degradation, the plant is now absent from eight of the original 18 North and South Carolina counties in which it was once found by the many thousands. In spite of higher fines and closer monitoring of public lands, poaching of diminishing numbers of the plant has increased due to greater demand and prices. In one area, 25 documented digs were noted in one year, but only one perpetrator was caught.

**Earley, LS. 1993.** A most wonderful plant. *Wildlife in North Carolina*. 57:2-3. This is a brief introductory one page summary article. It has several nice pencil drawings including shaded and cross views of stages of trap closure, and a map showing how the range of *Dionaea* has diminished. It is now mostly restricted to coastal areas except for an inward extension corresponding to the Green Swamp.

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## CARNIVOROUS PLANTS IN FIORDLAND NATIONAL PARK , NEW ZEALAND

Bruce Salmon, 13 Rothery Road, Manurewa, Auckland, New Zealand

In January 1991, I embarked on a trip to seek out C.P.s in the far S.W. corner of our South Island, Fiordland National Park. Covering some 1,214,000 hectares it is N.Z.s largest national park which includes pristine beech Forest, lakes, fiords and snow capped mountain peaks.

I took the boat from Manapouri across Lake Manapouri (an ancient glacial lake) to its west arm and the start of the Dusky Sound Track. I walked through tall Beech forest festooned with moss and crossed streams on 3 wire bridges as the track followed the Spey River to its source. Everything was dripping wet and small streamlets were in abundance. F.N.P. gets more than 6 m of rain annually.

After 5 hours I arrived at Warren Burn, an open grassy sphagnum swamp, which I had to cross to reach the hut where I intended to stay. Warren Burn is a natural haven for bag plants and was covered with large patches of our native orchid *Aporostylis bifolia* in mass flower. This distinctive little orchid has mottled green leaves and a single white flower atop a tall scape. There were also masses of *D. arcturi* everywhere. End they grew especially dense in the wettest areas. Their sparse bronze colored leaves grew to a height of over 10 cm and glistened with dew. Many leaves were without prey although a few had caught small crane flies.

In a higher part of the swamp where it was more peaty I found *D. arcturi* and *D. spatulata* growing together. The *D. arcturi* leaves were much shorter here being only 5 cm long and darker in colour. The *D. spatulata* measured about 2 cm across and were a nice red colour with numerous plants beginning to flower. The flowers, about 5 per scape, open one at a time and are about 5 mm across and pure white. *D. spatulata* seemed to be present only in this small area.

After taking many photos I retired to the hut to escape the persistent hordes of bloodsucking sandflies. The next morning I started early to climb At Memphis. After climbing through forest for about half an hour the trees began to thin out and large open areas appeared. These patches were very boggy and water was continuously seeping down the hill. It was here that I found the first colonies of *D. stenopetala* along with the ever present *D. arcturi*. The leaves were upright like *D. anglica*, spatulate and of a reddish bronze colour. The petioles of this species are distinctively canaliculate and the single white flower is borne on a tall scape about twice as high as its leaves. Further up the mountain *D. stenopetala* became smaller and much redder as its habitat became drier and more exposed. Both *D. arcturi* and *D. stenopetala* grow much

larger in wetter, sheltered areas than they do in open exposed situations. With the large numbers of these two species growing in close proximity on this mountain I never found a single hybrid.

*D. stenopetala* disappeared at about 2000 ft and were not found at the top of the mountain. At least I think it was the top. All I could see was the inside of a very grey cloud.

I made it back to the hut just as the rain began to fall. I did not find any *U. monanthos* which also grows in these mountains, but as anyone knows a *utricularia* without a flower is almost impossible to find. The next morning I left early in the pouring rain with a pair of fast walking Germans so that I could catch the first boat back to civilization and a hot shower. Unfortunately this was not to be as we managed to lose the track and find the biggest, deepest mud hole you could ever imagine. Needless to say we missed the first boat but luckily there were showers at the visitors centre to bring the warmth back to my bones.



Figure 1. Warren Burn Swamp, Fiordland National Park, New Zealand.



Figure 1: *U. uniflora* in flower



Figure 2: An overhead view of a *U. uniflora* flower

# Focusing on *U. uniflora*—a Butterfly Look Alike

Barry Meyers-Rice, Steward Observatory, University of Arizona, Tucson, AZ 85721  
email: bmeyersrice@as.arizona.edu

I grow many *Utricularia* from around the world and of the small terrestrials my favorite is *U. uniflora*. It is easy to grow, requires little space and its flowers are lovely. Attached to the tip of a dark glossy scape, each blossom resembles a little butterfly gliding in the air (Figure 1). Best of all, the flowers last several weeks. This article addresses *U. uniflora*'s cultural requirements so you can grow it successfully, and its morphology so you can be certain of its identification if you believe you are growing it.

In describing *U. uniflora* we must be careful because several similar species are in cultivation: *U. uniflora*, *U. monanthos*, *U. novae-zelandiae*, and *U. dichotoma*. Over time these plants have become confused in collections. The introduction of interesting new forms of these plants, especially by Allen Lowrie and other explorers, may compound this confusion. I hope this article on *U. uniflora* will help decrease some of the bewilderment. In the future I'll provide details on how to distinguish among these other species, but until then and in difficult cases you can refer to Taylor's monograph. Much of the information in this article is drawn from that work. If you are baffled by my use of botanical terminology, refer to my earlier CPN article, *Focusing on U. calycifida—a Variable Species* (CPN 21:1–2).

*U. uniflora* is one of many species with small leaves that poke randomly out of the soil. The dark green leaf blades are round, elliptical, or obovate, 1–2 mm wide and 2–3 mm long. Each is flat or often slightly curled, and a single almost undetectable vein runs along its middle. Palid-green or white petioles connect the leaf blades to threadlike stolons 5–10 mm underground. Bladders are produced only from the subterrene network of stolons and are uncommon. The traps are small, 0.5–1.5 mm across, and are borne on delicate stalks about 1 mm long.

Flowering begins with the appearance of a single smooth peduncle about 0.5 mm thick and round in cross-section. The peduncle is lustrous olive-green or brown-green, and never bears scales or branches. The scape grows almost perfectly vertically as if guided by a plumb line and is topped by a little 1 mm ball—the embryonic flower. On the plants I have grown or seen, the growing scape always holds the spherical flower bud at its apex, like a seal balancing a beach ball on its muzzle, until the peduncle reaches its maximum size of 8–20 cm (occasionally longer). The pedicel, round in cross section and like a smaller version of the peduncle, then elongates to 2–15 mm long. Meanwhile the flower bud swells in preparation for flowering. The scape is striking in its simplicity even at this stage before the flower opens. Usually several peduncles appear in succession, sparsely scattered in the pot.

The epithet *uniflora* means single-flower and this species lives up to this description. As with all *Utricularia*, a bract is formed at the union of the peduncle and pedicel (a bract is a usually small, often leaf-like organ produced in association with flowers). This species, like many others, also produces two bracteoles, one on either side of the bract. The bract and bracteoles on a *U. uniflora* flower are a few mm long, and are ovate or elongated with blunt tips. They are basifixed, which means they are attached by their bases to the peduncle. Since the species is single flowered, you would expect three little growths at the pedicel base: one bract and two bracteoles. But with

*U. uniflora* there are six! If you examine them closely with a hand lens you can see why. Nestled among the cluster of organs is a tiny dormant flower. This is why there are three extra parts—one bract and two bracteoles to accompany the dormant bud. So the epithet “single-flower” is only partly true. But why would the plant produce an unused flower bud? Perhaps the evolution of *U. uniflora* is reducing (or increasing) the number of flowers per scape and the bud is a vestigial appendage, a reminder of the plant's ancestry (or possible future). Or perhaps the second bud is an emergency back-up to be used if the first flower is damaged. To test this hypothesis I have removed the active flower bud from inflorescence at various stages of maturity, but the dormant buds have never been activated. Taylor states in his monograph that there can be two flowers to a scape, but this may be conjecture on his part—for example, rare double-flowered inflorescence have been observed for *U. menziesii* and *U. resupinata*. My *U. monanthos* very rarely produces double-flowered peduncles. A double-flowered *U. uniflora* would no doubt bear its two flowers in a pair at the peduncle terminus, as does my *U. monanthos* and *U. dichotoma* in their double-flowered incarnations.

What are the mature flowers like? The corolla's upper lip extends vertically a few mm from beneath the upper calyx lobe. It gently widens to its end which is often notched, or as is the case with my plants, faintly four-lobed. The lower lip is much larger than the upper, about 0.9–1.5 cm long. It is nearly level with respect to the ground, and in outline it is like an open hand-held fan or an extremely generous portion of a pie: two straight edges diverge from each other at an angle of 150 to 180 degrees, then are connected at their endpoints by a circular arc. Sometimes the outer margin is not quite circular, but is instead somewhat three-lobed. The lower lip is often perfectly flat, as if it had been pressed between the pages of a book, but in some specimens it is flexed downward or upward at the corners, like a skate or manta ray swimming undersea. There is no palate bulge on the lip, but near where the upper and lower lips touch is a row of 6–10 parallel ridges 1 mm long (Figure 2). As we shall see, these ridges are important in keying out this species. The spur is about as long as the lower lip and points 90 degrees away from it, down towards the ground. The spurs of many *Utricularia* taper to a point, *U. subulata* or *U. sandersonii* for example. On this plant it is cylindrical and even flares slightly to a rounded, unforked, tip. The calyx lobes are about 3–6 mm long and the upper lobe is a little larger than the lower. They are elliptical or ovate with rounded tips, but the lower lobe can be notched.

The petals are colored very nice shades of lilac or purple. My plants are lilac-mauve, with streaky patches of dark purple near the row of ridges on the lower lip. The central pair of ridges is always yellow, the flanking ones are white or the colour of the rest of the flower. The spur is white or pale green, and grades into pale yellow at the tip—the spurs on my plants have dark pinstripes. The calyx lobes are green but may be tinged lilac.

*U. uniflora* and *U. dichotoma* are in the section of *Utricularia* called *Pleiochasia*. They are similar species, and *U. uniflora* has often been considered to be only a variety of *U. dichotoma*. In his monograph, Taylor did not recognize any taxa below the species level, but in *U. uniflora* we have a rare case where he chose to recognize a tentative variety as a new species, instead of subsuming it into the old species. The two species are different in several ways, but the diagnostic Taylor sets out in his key relies on the ridges on the flower's lower corolla lip. For *U. uniflora*, the central yellow ridges are always shorter than or barely as long as the white and purple ridges flanking them. In contrast, the yellow ridges in *U. dichotoma* are much longer than the white or purple ones flanking them. The yellow ridges on my *U. dichotoma* are so much larger and more



conspicuous I never even noticed the purple ones until I read Taylor's descriptions and keys. Excellent photographs of *U. dichotoma* that illustrate this feature are in CPN 11:1, p18 and especially Slack's *Insect Eating Plants and How to Grow Them*, p172. There are other differences between the species. The flowers of *U. dichotoma* are usually heavily perfumed while those of *U. uniflora*, at least mine, are odorless. While *U. uniflora* seems exclusively single or perhaps double flowered, *U. dichotoma* can have one to three flowers arranged in a terminal whorl, or even more with pairs of flowers set opposite each other on the raceme. Lastly, Kondo and Whitehead found that while *U. dichotoma* is diploid, *U. uniflora* is tetraploid. That the yellow lower lip ridges are not longer than the flanking ones also distinguishes *U. uniflora* from the other species *U. monanthos* and *U. novae-zelandiae*.

In the wild *U. uniflora* grows in southeastern Australia: Tasmania, New South Wales, and southeastern parts of Victoria and Queensland. It grows in bogs and near streams and appears to prefer shadier habitats than the sun-loving *U. dichotoma*. It has been collected in flower during the spring and summer, from September to January.

The culture of this plant is easy. I use a method that works for almost all the tropical *Utricularia* except those that do better in live *Sphagnum*, and of course aquatics and semi-aquatics. When CPers refer to "standard *Utric* culture," the following procedure (or close to it) is usually what is meant. Use either pure dead milled *Sphagnum* or a 2:1 peat-sand mix in a 5 cm (2") pot. I use water purified by distillation or reverse osmosis and keep the water table at least a few cm beneath the soil surface. For established plants Slack suggests raising the water table above the soil surface but I don't. I know some growers are fortunate enough to be able to use tap water, but my Arizona tap water contains far too many dissolved chemicals. Keep them warm year round, around 20—30C (68—86F). If the plants are kept warmer they will survive but the flowers do not last as long. Since they are found in shady places in the wild I give them medium light. While this means some shade in the greenhouse, the light available in most 4—6 fluorescent bulb terrarium set-ups is fine. Even in the best conditions, *U. uniflora* does not grow quickly. It takes several months to fill the surface of a 5 cm pot with its little leaves. Its stolons do not explore too deeply into the pot, and I have never seen the plant grow out of the bottom as often happens with other species. Still, it is easy to propagate—carefully detach from the mother pot a hunk of leaves, stolons, and bladders, and plant it in a new pot. In time you will be rewarded with a display of lovely and long-lived flowers. While none of the major CP nurseries offer *U. uniflora* and it is rarely if ever stocked in the ICPS seed bank, many CPers grow the plant and by writing around you can usually locate some. Despite attempts at self and cross pollination, I have never been able to yield seed from my plants.

I hope this article and photographs have convinced you *U. uniflora* is an attractive species worthy of being in your collection. I like it so much that, whenever it is flowering and my wife and I are entertaining guests, I always bring the pot out of the greenhouse, wipe off any algae, and set it on the dinner table as an accent. Although dainty, its bold form always generates praise and pleases our guests—even those unfamiliar with my peculiar hobby and who gauge flowers by the gaudy excess of roses, Dahlias, or Iris. Their interest and delight is always heightened when I tell them the plant is a carnivorous guest joining us for the meal—a genteel individual that won't eat loudly, belch, or rudely interrupt conversation. Truly..... cultivated.



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# Focusing on *Utricularia*—*U. delicatula* and *U. lateriflora*

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This article is one in a sequence highlighting different species of *Utricularia*. My reason for writing the series is to clarify some of the confusion regarding this genus. I also hope to generate more interest in these plants which are usually raised by CPers only out of a sense of obligation to represent the genus in their collections. In this episode I discuss *U. delicatula* and *U. lateriflora*, both from section *Austroales* (a section is a group of related species within a genus). I am presenting these two species together because they are extremely similar and this way I can easily stress the differences between them. *Utricularia simplex*, the third species in this small section, can be distinguished from its two cousins by its short scapes (2–5 cm tall) which bear a single flower each. As a CP grower and trader, I have noticed *Austroales* species are regularly misidentified in collections. Sometimes they are mistaken for each other. Other times a plant labelled *U. simplex*, *U. delicatula* or *U. lateriflora* is in fact from a completely different section. Even when correctly identified these plants suffer the further insult of usually being misspelled “*deliculata*” and “*laterifolia*.” These are some of the simple points of confusion I hope these articles help combat. As in previous installments of this series, I will rely upon my own horticultural experience and Peter Taylor’s monograph as my principal sources. Parts of CPN 20:1–2 and my article on *U. calycifida* in CPN 21:1–2 may be helpful if you are uncertain of my botanical terminology.

The leaves of *U. lateriflora* and *U. delicatula* are very small, usually less than 1 mm wide and about 5 mm long. A typical leaf is either strap-shaped (often the case for *U. delicatula*) or narrowly obovate. What appear to be several leaves may only be one, since a leaf growing from a stolon may fork a few times before emerging at the soil surface. In fact, the majority of each leaf is underground, and Taylor states the length of a complete leaf can be up to 5 cm. Each leaf of *U. lateriflora* has a single faint central nerve, while *U. delicatula* can have a few more branching to the leaf margins. The underground stolons are threadlike and very delicate. The bladders are small, 0.5–0.7 mm long, and rare on my plants. Unlike those of many *Utricularia*, the bladders of these species do not have a pair of long bristles near the trap aperture. Instead, each trap has a single pointed appendage that curves close against the bladder opening.

The peduncles of both species (Figure 1) are wiry and thin (0.3–0.8 mm diameter). If you examine them closely you will see they are angled or polygonal in cross section instead of round. At maturity they average 3–15 cm long, but those my *U. lateriflora* plants produce are up to 35 cm long. Several ovate scales (0.3–0.4 mm long) are usually formed, and are crowded near the ground. (I will discuss the terms “scales,” “bracts,” and “bracteoles” below.) Each flower is attached to the peduncle by a pedicel approximately 1 mm long and flattened in cross section (it is wider than it is tall). With such short pedicels the flowers appear to be fastened directly to the peduncle axis (Figure 2). This is probably the origin of the name *lateriflora*—“lateral flowers” or “flowers to the side.” The name *delicatula* means “small and pleasing” or “delicate.” The ovate bract at the base of each pedicel is about 1 mm long, and is flanked by a pair of narrower but longer bracteoles. While *U. delicatula* usually produces 1–4 flowers

on a peduncle and *U. lateriflora* 1—10, there can be more. I have noticed *U. lateriflora* often produces pairs of flowers very near each other on the peduncle axis (i.e. within 5 mm), but not close enough to be considered “opposite” (Figure 1a).

The perianths (calyx lobes and corolla) of both species are practically identical, especially compared to variations within the species and those due to differing cultural conditions. Both calyx lobes are about 2 mm long, convex, and round or elliptical. The upper lobe is smaller and is often mildly pointed, while the tip of the lower lobe can be slightly notched (emarginate). The upper corolla lip is twice as long as the upper calyx lobe. Narrowest where it emerges from under the upper calyx, it then slowly widens to a usually emarginate tip. The lower lip is much larger than the upper, although at 5—10 mm long it is not gigantic. If flattened, the lower lip’s outline would be approximately circular—*U. delicatula* can be slightly three lobed while *U. lateriflora* slightly two lobed. The spur is approximately parallel to and about as long as the lower lip (that of *U. delicatula* sometimes shorter, of *U. lateriflora* sometimes longer). It is usually oval in cross-section (wider than tall) and is clearly bifid or forked.

Both upper and lower lips are shades of lilac or violet. Most lilac or purple flowered *Utricularia* species are prone to colour variations in plant to plant, and these species are no exceptions. These species have no inflated palate bulge—instead there is a also a small yellow spot in its place. Sometimes the spot is white, sometimes yellow edged in white. The colour of the spur is usually the same as the corolla lips, only a bit more pale.

How do you distinguish between *U. delicatula* and *U. lateriflora*? The differences I described above are too variable and unreliable for the job. But you can safely depend upon some lesser plant organs—scales, bracts, and bracteoles. And what are those? A scale is a small leaflike structure found on many plants, like the triangular growths on a stalk of asparagus. Many *Utricularia* species have scales, and by Taylor’s definition are always found on the peduncle somewhere between the ground and the lowermost flower. Both *U. delicatula* and *U. lateriflora* normally bear scales (Figure 1c,d). Bracts look much like scales, but bracts occur wherever a flower’s pedicel attaches to the peduncle. Stated another way, flower buds are produced in the bract axil. Sometimes a flower bud does not continue its growth beyond very early stages. When this happens the dormant or aborted flower bud may be so small it remains hidden by the bract, and you may mistake its bract for a scale (Figure 1b). But remember, scales never occur on a *Utricularia* inflorescence above the lowermost flower. Taylor considers scales to be sterile (i.e. not associated with floral parts) bracts. The bracts of many species (as in section *Austroales*) are flanked by a pair of bracteoles. Bracteoles are usually narrower than bracts but are otherwise similar. The evolutionary forces of nature are thrifty, and organs are rarely retained if they are not useful. So what purpose could scales, bracts, and bracteoles have? I recently severed the tip of a *U. prehensilis* scape by accident, and in a few weeks a new scape branch grew from behind a peduncle scale. Oddly, a few rhizoids (the closest *Utricularia* get to having roots) also grew from this scale. So at least in this case the scale was protecting a region of meristem tissue. This tissue was activated into growth by the damage the scape suffered, and the plant flowered successfully. Similarly, I think a function of bracts and bracteoles is to protect embryonic flower buds from damage.

Armed with this information we can examine the differences between *U. lateriflora* and *U. delicatula*. The bracts on *U. delicatula* are almost always found at the base of a fully developed flower—very rarely do they cover dormant buds. In contrast, only half or even fewer of the bracts on *U. lateriflora* are at the base of fully developed

flowers, the others subtend forever dormant flower buds (Figure 1). The presence of non-flowering bracts increases the spacing between flowers, giving *U. lateriflora* a sparser inflorescence. There is a second way to key out these two species based on how the seed capsules open at maturity. A seed capsule of *U. delicatula* splits along a single line on its underside, from capsule base to tip. A capsule of *U. lateriflora* develops two splits on opposite sides of the capsules. I prefer the bract method of keying between the species because it can be done at a glance.

There. That is all. The presence of dormant flowers and a detail in capsule dehiscence. You may rightly wonder whether such small differences really warrant a division at the species level. After all, *Sarracenia flava* occurs in many forms—why not classify these as separate species or subspecies? One reason is there are intermediate specimens for all those varieties. Also important, the sizes of the populations of the intermediate specimens are not tiny compared to those of the varieties. So the *S. flava* forms are not really segregated into separate and uniform populations (as Paul McMillan has argued, *S. flava* 'rugelii' may be an exception). The case of *U. lateriflora* and *U. delicatula* is difficult, and in the past Taylor believed them both to be components of the same species. But the differences between *U. lateriflora* and *U. delicatula*, although small, are consistent and there are few specimens of plants with intermediate characters, so in his monograph he concluded the split is justified. Perhaps it is best to defer to the botanists familiar with the genus and who have seen all the evidence. But botany, like the other sciences, is constantly refining and evolving in its conclusions, and this issue is open to everyone's ruminations. Maybe we should take a vote!

The natural range *U. lateriflora* is large—it is found throughout much of southeast Australia at low elevation, including New South Wales, Queensland (south of 25 degrees S latitude), South Australia, Tasmania, and Victoria. In this range it grows in wet sand or peat soils. Herbarium records show it flowering every month of the year. The specimens of *U. lateriflora* that most resemble *U. delicatula* are found in Tasmania. (Allen Lowrie distributes seed of a Tasmanian plant he calls *U. lateriflora* 'Single large mauve flower'—it will be interesting to see how these peculiar specimens fit into the bigger picture of the species.) East of this range, separated by more than two thousand kilometers of Tasman Sea, is the much smaller range of *U. delicatula*. It is restricted to wetlands in the northern half of New Zealand's North Island, where it has been collected in flower during the southern hemisphere summer (November—February).

The plants are slow growers but respond well to standard tropical terrestrial *Utricularia* culture (see my previous "Focusing on *U. uniflora*" article for details). There are apparently some cultural conditions which must be met for the plant to flower. I don't know what they are, but they are fortunately satisfied by accident a few times each year under normal culture. When this happens every pot in the growing area will simultaneously produce scapes. A flowering phase usually begins in the spring and can last several months. When I started to grow these plants I was concerned about what size pot I should use and how deep of a water table was necessary because I knew the stolons of these species probe far underground. After experimentation I discovered they species require no more room than other small *Utricularia*—a 5 cm pot sitting in 1—4 cm of water is just fine. If you overturn a pot of established plants and carefully knock the soil out you can inspect the minute threadlike stolons and long leaves for yourself. I can appreciate how difficult it must be for botanists to collect this plant in the wild for their presses! In time a colony of plants will completely

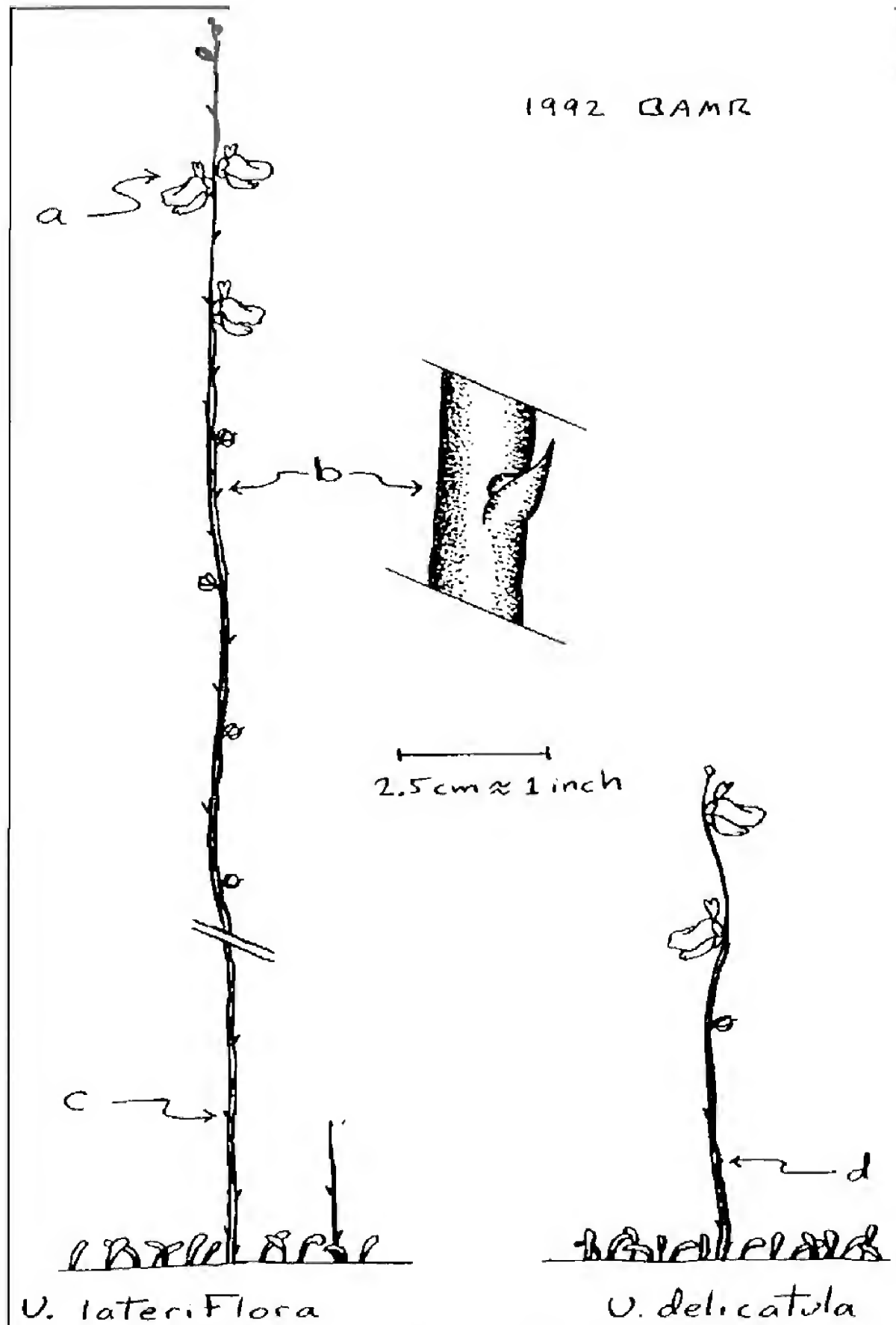


Figure 1 *U. lateriflora*: a—near floral pair, b—bract with dormant flower (also shown highly magnified), c—scales; *U. delicatula*: d—scales.



fill its pot with leaves. When this happens flowering often decreases or stops, so I carefully cut out a deep hunk of soil and inoculate a fresh pot of growing medium with it—the rest goes in the mail to other growers. Seed from my plants has never germinated.

These plants are certainly not very impressive in or out of flower but their delicate beauty makes them well worth growing. I group my diminutive *Utricularia* species in a single tray so while individually they are easily overlooked, together there is always at least one plant flowering.

I would like to thank Peter Taylor and Don Schnell for previewing this and the other installments of this series, and for their helpful comments and criticisms. However, any inaccuracies or opinions expressed in these articles are fully my own.



Figure 2 *U. lateriflora*: A near floral pair. Even the bracteoles can be longer than the pedicels of *Australes* species.

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## Focusing on *U. gibba*—The “U” stands for Ubiquitous!

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A reason I enjoy growing *Utricularia* is that so many are extremely tolerant of differing cultural conditions and forgiving of mistakes and neglect. But ask me about growing aquatic species and I become edgy. After a few months or years, whatever aquatics I try to grow invariably wane and finally die. But there is a class of aquatic *Utricularia* which are easy to grow and are not so sensitive—the affixed aquatics. While these plants grow in water, they must be in contact with a substrate of soil to prosper. The lovely species *U. gibba* is such a plant.

The genus *Utricularia* is broken into two subgenera, *Polypompholyx* and *Utricularia*. In the latter subgenus are thirty-three sections and the largest (section *Utricularia*) contains thirty-four species including *U. gibba*. This section contains most of the familiar yellow flowered aquatics such as *U. macrorhiza*, *U. vulgaris*, and *U. australis*. Fortunately *U. gibba* is easily distinguished from most of these other species so identifying it is rarely a problem. I'll start this discussion of *U. gibba* by describing its form and habit so you can identify it yourself. Then I'll summarize how *U. gibba* has been confused with other plants in the past and lastly I'll include cultural tips. Describing any plant requires the use of some jargon and if you are confused by my usage refer to my *U. calycifida* article (CPN 21:1) and parts of CPN 20:1-2.

*U. gibba* grows in water only several centimeters deep. Examine a clump and you will see it consists mostly of green stolons which branch and intertwine to form a loose mat. This network commingles with the oozy muck of the pond bottom and anchors the plant underwater. Plants that grow like this are called affixed aquatics. Each stolon is several centimeters or more long and 0.2—1 mm thick. The stolons are terete (round in cross section). Rhizoids (small root like organs) may be visible hanging from the stolons especially near peduncle bases. They are only a few centimeters long.

Leaves are attached to the stolons at about 1 centimeter intervals and are small, only 0.5—1.5 cm long (Figure 1). Each consists of a pair of green hair like segments attached to the stolon in a V-shape. Sometimes each segment branches so a leaf has four to eight tips. Viewed under a microscope, each leaf may be seen to bear occasional lateral teeth, each tipped with a little distinct spike (or setula, plural setulae). The tip of each leaf segment is also setulose. Setulose leaves are a common feature of species from section *Utricularia*. Bladders are moderate sized (1—2.5 mm long) and are found only on leaf segments (usually not more than a few per leaf). Under a microscope each is bare of appendages except some long bristles near the trap's opening.

Some clones of this plant yield few flowers, while others (the ones I retain in my collection!) produce many. Peduncles are usually 2—8 cm tall, less than one mm thick, and terete. They do not twine or branch. Up to two basifixed scales about 1 mm long may reside on each peduncle. These scales have an interesting shape—if you detached and flattened one it would be semicircular or almost rectangular. Each peduncle usually bears two to six flowers (but may have anywhere between one and twelve) arranged in a very loose spiral above the water level. The pedicels are 0.2—3 cm long, terete, and green like the peduncle. Bracts (one at each pedicel base) are shaped like the scales. *U. gibba* does not have bracteoles. Taylor tells us that submerged cleistogamous flowers can develop on short peduncles. I've never observed them but they might just be eluding me in the stolon mat.

The calyx lobes (the two sepals) are 1—3 mm long, the upper lobe being slightly larger than the lower. Both are approximately round or ovate with rounded tips and smooth margins. The corolla (Figure 2) is typically large (2—2.5 cm long) and dwarfs the calyx but Taylor informs us that the flowers of some clones are as tiny as 4 mm long. Something that distinguishes *U. gibba* from most species of *Utricularia* is that the corolla upper lip is usually larger than the lower lip. The upper lip is circular or rounded-ovate and often clearly three-lobed. It is curved into a bowl-shape—like a clam shell—and is held vertical. The lower lip is also rounded in outline and has a prominent inflated palate bulge. The specific epithet *gibba* means bulge and refers to this. The long, straight spur is cylindrical or conical and is pressed close against the underside of the lower lip. The lower lip is either flat or may drape downward on either side of the spur. The spur often pokes out from under the lower lip. Its tip may be bifid. The entire corolla is yellow, often with red or brownish veins on the inflated palate bulge—standard coloration for most species in section *Utricularia*. The flower is odorless and lasts for several days to a few weeks before withering. For me, the whole effect of the flower is that of a baby bonnet—the upper corolla lip marks the baby's hood and the lower lip and spur represent the jewels and protruding nose of the sadly unattractive infant.

Like the CPer's CP weed *U. subulata*, this species has an enormous range. It grows on every continent of the world (except Antarctica) and is limited only in preferring warm climates. It occurs in most of the U.S.A., even Hawaii, except the plains and rocky mountain states (as usual it is not found in my own CP-deficient state of Arizona). It flourishes in all kinds of freshwater wetlands and Taylor even observed it growing as a semi-epiphyte. While it much prefers to grow in shallows it can occur as a free floating aquatic but rarely flowers in this condition. I have seen it on

Vancouver Island, Canada, growing in this form. In more suitable habitats *U. gibba* flowers during the warm time of the year, or year-round in tropical regions.

*U. gibba* is mentioned by Taylor as being one of the several most variable species in the genus—not too surprising considering its large range. The chief variation is in the size of the flower. Since Linnaeus first included the species in his *Species Plantarum* in 1753 more than sixty varieties of *U. gibba* have received temporary species status, four times even in genera other than *Utricularia*. During his career Taylor recognized several of these putative species but by the time he dealt with the group in his monograph he consolidated them all into *U. gibba*. I recommend you read the discussions of *U. gibba* and *U. striata* in his monograph for the details of his arguments if you are interested. The essence of his reasoning is that while some forms of *U. gibba* have large flowers and others bear small flowers, a continuum of plants with intermediate corolla sizes also exist and these plants blur the distinction between proposed species or even subspecies within the species *U. gibba*. The widely cited species *U. exoleta* and *U. obtusa* are both absorbed by Taylor's treatment into *U. gibba*. An excellent field photograph of *U. gibba* is on the back cover of CPN 21:3, where a typographical error identifies the plants as a *Drosera*.

The history of *U. gibba* in the U.S.A. is particularly confused. Biologists have tried to recognize a complex of three species they called '*U. gibba*,' '*U. biflora*,' and '*U. fibrosa*'—all with similar flowers. The main difference between '*U. gibba*' and '*U. biflora*' was considered to be the size of the lower corolla lip. For example, an old key in CPN 2:4:p66 by Kondo describes the lower lip of '*U. biflora*' as 8—10 mm long and that of '*U. gibba*' as only 5—6 mm long. Also the name '*U. gibba*' was applied to specimens which had short, blunt spurs, while '*U. biflora*' was used for plants with longer, more slender ones. But many intermediate cases indicated these divisions were artificial. Lastly, it was thought '*U. gibba*' usually had fewer terminal leaf tips than '*U. biflora*.' Again this was found to be unreliable and poorly correlated to flower size. So '*U. biflora*' and '*U. gibba*' were combined into the species we know today as *U. gibba*. And how does '*U. fibrosa*' fit into this? Looking into the old literature, Taylor deduced two things. First, the original description of '*U. fibrosa*' by Walter was actually an account of *U. gibba*, so '*U. fibrosa* Walter' is a synonym of that species. Second, Taylor found that in the intervening years biologists mistakenly began calling a different species '*U. fibrosa*,' thinking it was the plant Walter described. This additional species had been described already under the name *U. striata*, a name Taylor adopted in his monograph. So in summary, sometimes the name '*U. fibrosa*' refers to *U. gibba* and other times it refers to *U. striata*. The easiest way to tell them apart is that *U. striata* produces two types of leaves—its leaves are dimorphic. One type of leaf is part of a stoloniferous and subterranean network much like *U. gibba* and the other type of leaf is foxtail-like and floats freely in the water. I observed fine specimens of this species in Lake Oswego, New Jersey, and in my ignorance reported it in CPN 18:3:p70 as '*U. fibrosa*.' Excellent drawings of *U. gibba* and *U. striata* are in the dicot volume of *Aquatic and Wetland Plants of Southeastern U.S.* by Godfrey and Wooten. In this work *U. gibba* is portrayed as *U. biflora*, Figure 323, and *U. striata* as *U. fibrosa*, Figure 315d. So there it stands—time to make annotations in the margins of the *Utricularia* sections of your reference books! And when in the midst of *Utricularia* confusion in the field or greenhouse, it is reassuring to your ego to know that professional botanists have been just as baffled.

For a quick reference, if you are in the field in North America and you find a yellow flowered aquatic *Utricularia* with a very large upper corolla lip (and no floats as in *U. inflata* or *U. radiata*), examine the leafy parts very carefully to see if there is only one kind of leaf. If the leaves are dimorphic, with some being big feathery foxtail-like leaves, then you have *U. minor*, *U. striata*, or *U. foliosa*. Also if possible, see if you

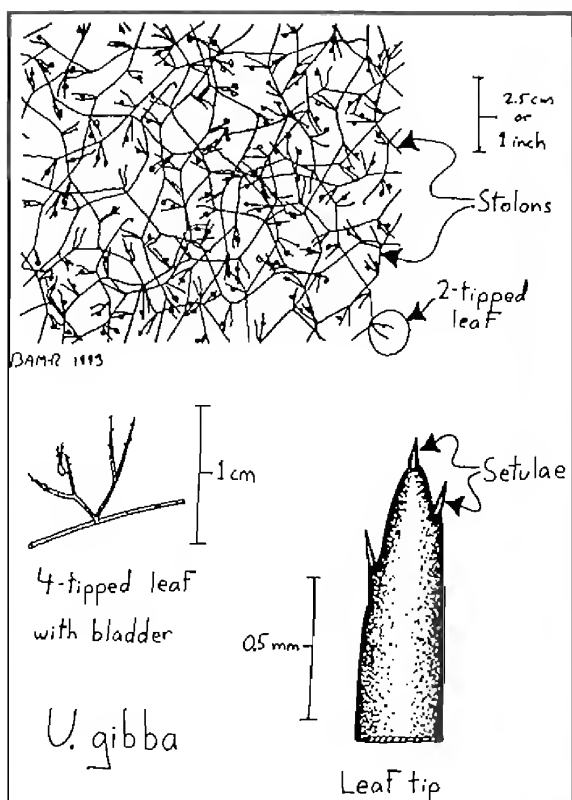


Figure 1: *U. gibba*—Vegetative features.

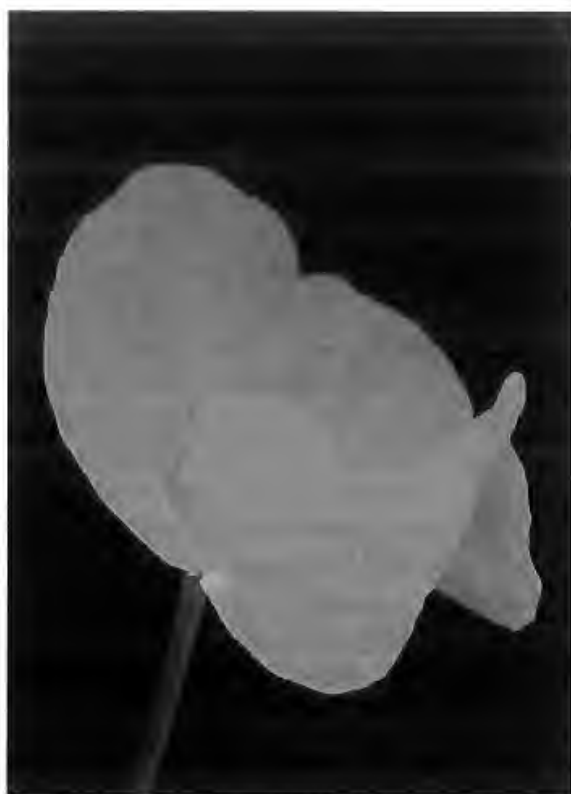


Figure 2: *U. gibba*—Chasmogamous flowers of a Florida clone

can find any ripe seed capsules opening. Do they open by a vertical spit that divides the capsule into two equal halves? If so, chances are you're looking at *U. gibba*. But for a good key, certainly more complete than the information in this paragraph, look to CPN 20:1-2.

As I mentioned above, affixed aquatics are infinitely easier to cultivate than suspended aquatics. Suspended plants are much more sensitive to the chemical balance and temperature of the water. Also algae overwhelm the plants and treatments for it often kill the *Utricularia*. In contrast, my technique for affixed aquatics is easy and nearly trouble free. For a growing container, you need a sturdy undrained pot or tub at least 7–10 cm deep and about 15 cm or larger in diameter. In this container lay 2–3 cm of pre moistened peat moss, peat-sand, or *Sphagnum*. Add a top dressing of a few centimeters of washed sand. The sand layer weighs down the peat so the water stays clear. Also since sand is lighter colored than peat it absorbs less sunlight and the water will stay cooler. Carefully add enough pure water to submerge the sand a few centimeters. If your clone of *U. gibba* is sturdy it may be planted immediately but I usually prepare a new tub a few days before I need it. This is to let the chemistry of the water equilibrate before introducing the plants.

Planting the *Utricularia* is trivial. Make a depression in the sand layer and wedge the plant into it. Then anchor it with sand, allowing some parts to still get light for photosynthesis. Thereafter keep the water table a few to several cm above the top of the sand. The plant will grow rapidly, making some stolons that wind through the sand and peat layers and others that float freely in the water. If you insist on growing the plant in deeper water or as a suspended aquatic it will not flower. When adding water take care not to disturb the sand layer or else you may allow mucky black peat to bubble up and dirty the water. The plant prefers full sun and can survive temperatures between 0–40C (32–104F) but you should try to emulate the climate of your specific clone's geographical home. I usually repot in early spring because after a winter of

slowed growth algae start to clog the *U. gibba* and irritate me. To repot I pull out the mass of *Utricularia* and replant a portion in a new container using the method I described above. The remainder is sent to other growers. By summer the tub is dense with growth and a profuse display of flowers. Strangely, my most floriferous clone never produces seed but clones which rarely flower often do produce seed.

I never fertilize *U. gibba* because it would probably result in an algae bloom. If you live near a very pure pond, you may want to take a few spoonfuls of pond water and add it to your *U. gibba*. The natural fauna will help feed your plant's traps, and may help graze the algae. But beware, it could also introduce pests such as snails which might eat the *Utricularia*! The only pest I have ever had on this plant are aphids attacking flower peduncles but removing the few infested inflorescence eliminated the problem immediately.

I am a reasonable person, so when I show newcomers my greenhouse I understand when they get a chuckle from seeing the tubs of my aquatic plants. One friend summed it up well when he said, "You're growing mud!" That is when I show them a container of *U. gibba*. While the other aquatics may not be doing much except looking mucky, *U. gibba* is almost always putting on a great display of lovely blossoms. It is a gratifying plant—grow it!

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## SARRACENIA CONSERVATION CONFERENCE

Report by Don Schnell (Rt. 1, Box 145C, Pulaski, VA 24301)

On 22-23 September 1993 a special conference called to discuss aspects of conservation, horticulture and trade of the genus *Sarracenia* was held at the Atlanta Botanical Garden. The conference was hosted by Ron Determann, supervisor of the Fuqua Conservatory, and Madeleine Groves of the Fauna and Flora Preservation Society (British). The conference was moderated by Ron Determann who did an excellent job of conducting lines of thought and gently bringing discussions back from tangents. About 40 invited people attended, a rather phenomenal number considering that there was no financial underwriting by the conference for travel, room, etc. The conference in effect centered on the southeastern states, and particularly the Gulf coast.

A written proceedings will be distributed to conferees in the near future, and supposedly will also be available to anyone inquiring. I will let readers know about this as soon as I hear more. In the mean time, I thought it would be useful to briefly summarize some of what I took away from the conference as well as my views on it. What I will present is certainly not complete since we spent about 12 hours in session. Further, what I have selected is of course inevitably colored by what struck me. Selectivity for these two reasons must necessarily be subjective to some degree.

The backgrounds of attendees were quite varied. We had professional botanists, hobbyists, commercial interests, a paper company, National Forest folks, field people from the Fish and Wildlife Service, TRAFFIC/WWF, state departments of natural resources, and so on. A very interesting cross section indeed. In addition to people from the US, there were attendees from Great Britain and Netherlands. The conference philosophy was a freewheeling informal brainstorming session in which topics were introduced by Ron and opened for comment.

During the round of introductions we were each asked to speak of our interests and quite independently several of us voiced a conclusion right at the beginning that the best hope for sarracenias was immediate preservation of large blocks of land containing good ecosystem, with "hydrology" secure, and with sound and continuous management. During the conference it was proposed by one conferee that a Pitcher Plant



National Monument be established as several separate parcels of such land located in appropriate parts of the country. To my mind, the latter smacked of some government participation which is very unlikely to any substantial degree, and would more likely slow efforts and tie them in red tape. I felt accelerated private financial backing such as Nature Conservancy would be best. While "everyone" is fascinated by pitcher plants, few are willing to put up the significant efforts and funds to establish such reserves. But, pitcher plant areas also have many other important plants, animals and biological interactions that deserve saving, and taken together would appeal to a larger segment of the population. Talking with folks between sessions out in the hall led me to believe that many if not most there felt the same about preserving land by whatever means.

Conservationists among us are familiar with the widely held concept—deserved or not, still widely held—that the US Forest Service has essentially acted as a sales agent to dispense tree cutting rights to various timber companies, and that they do the job badly from the people's point of interest. Clear cutting is out of hand, there is graft and cheating that honest field officials are forced to overlook by Washington, the Forest Service pays for all roads leading into cuts, and all in all such sales result in a loss financially to the American People. The Forest Service representatives at the meeting pointed out that in the last ten years or so the Service has tried to forge a new direction by hiring many biologists, hydrologists, ecologists, soil surveyors, etc., all to implement the motto, "Land of many uses" which we have all seen on signs on entry into Forest Service lands.

My feeling, and that of several others, was that the Forest Service—besides continuing timber business largely as usual—is further caught in a trap of "multiple uses" promises. For example, off-road vehicle hobbyists have a right to use some part of the Forest for their sport, and often like a run through wetlands as a challenge, wetlands where pitcher plants may grow. They and many other interests must be accommodated somehow. The representative mentioned that under law people cannot just come into a National Forest and dig or pick plants and remove them, yet thousands of acres of herbs, shrubs and "junk timber" are destroyed annually in the process of clearcut or replanting into monocultures. Most felt the jury was still out on what the Forest Service could or would do with this additional professional help. The Forest Service is under the Department of Agriculture which fosters crop production, and timber is a crop.

On the other hand, some small efforts are underway on Forest Service land. The two *Pleea* savannas in the Appalachian National Forest are two examples, and there are plant surveys underway there in other areas. We received a handout summarizing half a dozen projects being undertaken to conserve areas of the National Forests. While it would be unfair to count the Service out yet, they do have a long uphill climb to overcome past and even recent activities and misplaced policies.

This leads quite naturally into timber and paper company activities on their own extensive land holdings. Our representative was from a company mainly centered along the Gulf coast. He mentioned cooperation with researchers and watching over some small areas. His company's policy was to abandon deep ditching and bedding site preparation as too expensive for what they got out of it, so they would just go around sites not suitable for silviculture. However, management of such sites, often pitcher plant wetlands, precluded burning since this presented control difficulties and expense in light of adjacent silvicultural stands. Therefore, fire is inhibited and such areas are likely to deteriorate. Also, one wonders what of the previous deep ditching and bedding?

I might mention that this is not the policy of two other paper companies in the

eastern Carolinas where deep ditching has been quite successful in producing mesic lands for silviculture. I have seen quite regularly over the past few years locations literally occupying a few square miles drained dry and everything leveled, burned and removed ready for planting. Since timber is about to play out in the far west, there is increasing pressure on southeastern timber areas.

It was mentioned that significant pitcher plant sites are located on military bases, particularly the sprawling Eglin Air Force Base. Many times these marginal" portions of military preserves are used for gunnery and bombing practice. Also, while many military installations are surprisingly open to outside visitors, there are restrictions on sites to even most military weapons testing and firing range personnel.

The subject of mass education and urging public pressure on owners of pitcher plant bogs was brought up. The problems of cost, vehicle of education, direction, etc. were all brought up. Some conferees felt that rural land owners have become quite suspicious of "government"(even private concerns mentioning conservation or asking about their lands being held in the same light as "government") as a result of Endangered Species Act activities. Most rural land owners seem to feel scared of ESA efforts, and if pushed would resist even further, and have been known to destroy sites on their land so they would not be bothered. Also, a groundswell of public activity might lead to overbearing legislation which would contribute to the negative land owner feelings. Still, the conference felt that "gentle", sensitive efforts should be made to purchase suitable sites, or at least convince the land owner to agree to a management plan. In spite of the picture of southern rural land owners presented above, many are quite educated, reasonable and even take pride in these mysterious plants that have everyone in an uproar.

There were representatives of land owners who harvest and sell pitchers of *S. leucophylla* at the meeting. Readers will recall that this has become an industry with up to several million such pitchers harvested each year. There are concerns about how such leaf removal might ultimately harm the plants. The harvesters at the meeting mentioned that they only harvested from their lands or leased lands, and that they paid out considerable expense for help, leases, insurance, packaging, shipping, etc. Also they exhibited some selectivity in that they harvested no more than every third pitcher and picked those that seemed most horticulturally acceptable. They cut the pitchers from the plant leaving the lower six inches or so of digesting insects which they thought would help the plant.

The problem with the situation as they see it is poachers. These are not owners and leasers and they frequently raid sites and literally tear up pitchers and sometimes plants by the handful to quickly load them into trucks as large as tractor-trailer size. As a result of these poachers, and also more people doing legitimate harvesting, the bottom is falling out of the domestic and foreign market such that expenses are close to exceeding profits and many may be driven from the business. The question then arises, what will these land owners do to make this pitcher plant land productive now?

A few notes on commercial aspects. Theo de Groot of Cresco in the Netherlands mentioned that the huge greenhouse ranges of CP of which he brought photos are all now the products of tissue culture and leaf cuttings. He said he and his country were acutely aware of CITES and obeyed all rules strictly. Several people in the group mentioned incidents of how CITES had been circumvented (although not in the Netherlands). They stated that there were ports well known to exporters where nearly anything could be passed, often in the same country where other ports were strictly monitored. One only had to address the easy port of entry. Also, shipments of *S. leucophylla* pitchers had been labeled as fern leaves, shipped out of Miami, and received undisturbed at one of these easy ports. No one would have known of it had

the shipper in this country not bragged of it.

Bob Hanrahan mentioned that in spite of much concentration on selling CP in this country and field collecting by individuals, the market was actually relatively small and soft. He stated that his property where he raised and propagated CP for market in the US could easily supply the entire world demand for American CP. It seems to be a matter of logistics and information. Also, he and several other US and non-US dealers did not intend selling CITES plants since it was too troublesome and expensive to keep up permits, inspections, etc., considering the even smaller market for these plants. We seem to have an irony that legitimate marketers for CITES plants (eg *S. oreophila*) are actually discouraged (in spite of what Fish and Wildlife say) selling their plants in the small market. But the numbers of people desiring such plants are enough that if they field collect even for lust personal use, they can significantly damage many small and threatened locations containing the only plants left in nature.

The main threat to CP locations is still destruction of habitat, either actively or passively by restricting fire. Personal collecting for private growing is not a threat except in very limited and sensitive situations such as mentioned above (*S. oreophila*, *S. rubra* ssp. *jonesii*, etc). Commercial collecting is way down and largely restricted to contract with small property owners.

There was active discussion of whether the southeast should be thoroughly surveyed for any remaining unknown CP stands of importance. Privately, many discussants mentioned to me that resources should not be wasted on small populations which are essentially doomed, the exceptions being locations of the above mentioned plants which are so few in numbers now, and even then only the best few sites selected for active management. One discussant expressed a strong question of whether we really needed to know of every last *sarracenia* site, that the aura of mystery and concept that they were still out there somewhere would be lost. Others strongly disagreed and felt that surveys should proceed apace. Surveys are expensive and approaches from public roads are pretty well exhausted, requiring use of such vehicles as helicopters for efficiency, but this is particularly expensive.

Finally, a few odds and ends. India is actively into producing *Dionaea* for the world market. de Groot is so impressed with the quality of their material for the price, and quantity, that it is cheaper for him to import from India to wholesale from his nursery than to raise the plants himself. I thought to myself of the possible irony that one day we might import *Dionaea* from India for sale in the US! Honduras is gearing up to grow *sarracenas* in large numbers, primarily for the cut leaf trade, possibly as plants later.

All in all, it was a very good meeting. It was the first time that so many people knowledgeable of and having keen interest in *sarracenas* met in the same room under very civil circumstances. Naturalists exchanged views with people in government and the commercial world and we all left unbruised and I believe better advised on many aspects of this problem. There were no facile solutions, no "white paper", because the problem is so huge and complex. We can talk glibly of "habitat destruction", but all the facets of that are so large and extended and so far progressed that just blaming people without offering alternatives and action is not enough. We are past that now and must save as much as possible of that 3% of southeastern savanna that is left, and quickly.

Again, my appreciation, congratulations, and tip of my field hat to Ron Determann and Madeleine Groves for a job very well done, fellow conferees who took the time and trouble and even traveled from overseas in some cases, and the Atlanta Botanical Gardens for being such a gracious and patient host.

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praelonga .....	\$4.00 ea.	*pumila .....	\$1.25 ea.	capensis - alba .....	\$3.00 ea.
longifolia .....	\$4.00 ea.	*pumila var. bushwellii .....	\$5.00 ea.	rotundifolia .....	\$3.00 ea.
purpurea .....	\$3.00 ea.			binata .....	\$2.50 ea.
				intermedia .....	\$1.00 ea.

### GREAT SAVINGS

BEGINNER SETS: Includes cultural directions and plants (our choice)

\$ SET 1; Recommended for 10 gallon tank use. Includes - 3 Flytraps, 3 Sundews, 2 Butterworts, and 2 Pitcher plants ..... \$13.95

\$ SET 2; Recommended for 20 gallon tank use. Includes - 6 Flytraps, 6 Sundews, 4 Butterworts, and 6 Pitcher plants ..... \$29.95



